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University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
Crawford 317 • 2550 Campus Road • Honolulu, Hawai'i 96822
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

March 17, 1994
RP:0155

Mr. Michael Lee
District Engineer (PODCO-O)
U.S. Army Corps of Engineers
Building 320
Fort Shafter, Hawaii 96858

Dear Mr. Lee:

Department of the Army Permit PODCO 93-012
Kahinapohaku Fishpond
Moanui Ahupua'a, Moloka'i

The Kahinapohaku fishpond is one of two aquaculture facilities which the State proposes to restore as demonstration projects. The objective of restoring the two aquaculture facilities is to revitalize the community and ohana-based traditional operation and management skills once associated with ancient Hawaiian fishponds and fishtraps. The purpose of the proposed project is to repair and reconstruct Kahinapohaku Fishpond to restore it to working condition. Tsunamis, storm waves and the lack of maintenance have contributed to structural damage to the fistrap walls. If issued, the Department of the Army Permit would also authorize periodic and post construction maintenance of the fishpond.

We have reviewed the PODCO with the assistance of Franciscu Gerritsen, Ocean Engineering; Charles Fletcher, Hawaii Institute of Geophysics; Yoshitsugi Hokama, Pathology; and Heather Keevill of the Environmental Center.

Pond Walls

Repairs are said to consist of reconstruction of the pond wall and one wall opening or *makaha* (page 1). This reconstruction plan is inconsistent with the historic construction of fishponds. Summers describes the flushing of silt from the pond using the *makaha*. "In order to prevent the filling of the pond with silt, an entrance, probably with a *makaha*, was sometimes built near the shore on either side of the pond. On the flow of the tide, the water entered through one entrance and washed the silt to the other side of the pond where it would be carried out through that entrance at the ebbing of the tide. This method of

cleaning was employed in the Moloka'i ponds." Since siltation is known to be a significant problem on Moloka'i, it would be more appropriate for the restoration to include two *makaha* to allow for increased circulation and perhaps some flushing of silt.

Another issue with regard to wall construction is the height and angle of the wall. Kikuchi noted that "the slope of the seaward wall appeared to be greater then that of the inner face. The purpose of the slope was to withstand wave energy." While the dimensions of the wall provided in the PODCO do not mention the slope, that aspect of construction is important in reducing wave reflection from the surface of the wall and subsequent scour at the toe, as well as maintaining the historic significance of the pond.

Use of Equipment

On page 2 a reference is made to the use of "heavy equipment." We are aware of activities at other fish ponds on Molokai where the coastal area was heavily impacted by use of heavy equipment. A more thorough discussion should be provided including a complete list of the heavy equipment that may be used, and an explanation of how the equipment can facilitate the restoration process without jeopardizing the adjacent reef areas.

Water Quality

Water quality is important for a fishpond, not only to comply with Department of Health water quality requirements, but also so that the fish produced within the pond are healthy. The main threats to water quality are siltation and turbidity. While page 2 of the PODCO states that reconstruction of the wall will temporarily increase turbidity, there is no mention of the source of the sedimentor how it will be removed from the pond. Information should be included on the extent of erosion up stream from Kahinapohaku and mitigation suggestions should be provided if erosion is significant. In addition, the mechanism for the removal of sediment should be discussed and a prearranged deposit site identified.

Another issue related to water quality is the potential presence of cigua toxins in the area that can cause ciguatera poisoning in humans. Ciguatera poisoning is caused by eating fish that have accumulated cigua toxins. The illness may last for one day, or for years, depending on the dose and the reaction. If cigua toxins are present in an area, disturbance of the ocean environment may increase the bloom of the cigua toxin carrying dinoflagellates and therefore the occurrence of ciguatera. Ideally, a study to determine the presence of cigua toxins should be done before and after restoration. However, the cost of this process may be prohibitive, so alternative solutions may be in order. Given that future pond restoration projects may come from *ohana* groups, it may be possible to experiment with methods for removing cigua toxins if they are present in a restored pond. We understand

that research is being conducted at the University of Hawaii on methods of eradicating dinoflagellates that carry the cigua toxin from specific areas.

The issue of ciguatera is extremely relevant in the context of fishpond restoration. If *ohana* groups and/or government agencies put forth the effort to restore a pond, they should be aware of the potential for cigua toxins to render their fish inedible. Since the goal of fishpond restoration is to revive the Hawaiian cultural and historic value of subsistence agriculture, the presence of cigua toxins would not be desirable. The potential impacts of cigua toxins should be addressed, and mitigation measures should be outlined.

Conclusions

Honouliwai and Kahinapohaku are demonstration ponds. They will set a precedent for the review, analysis, and consideration of environmental impacts and compliance with government regulations of subsequent ponds. Policies and procedures for dealing with common issues such as access, silt removal, or management of vegetation, should be addressed and mechanisms for dealing with those issues as they arise should be included in the PODCO.

At such time as Kahinapohaku or other fishponds are approved for restoration, we strongly urge that environmental conditions pertinent to the individual pond and its coastal area be diligently monitored. This should include a set of beach profiles to provide information on any changes in erosion and sediment transport, as well as tests for cigua toxins. In addition, more information is needed on the type of heavy equipment to be used, the mechanism for silt removal, and the number and location of the *makaha*.

Sincerely,

Jacquelin N. Miller

Jacquelin N. Miller
Associate Environmental Coordinator

cc: OEQC
Roger Fujioka
Franciscus Gerritsen
Charles Fletcher
Yoshitsugi Hokama
Heather Keevill